

Pneumococcal Surveillance in Indiana

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Disease caused by *Streptococcus pneumoniae* results in widespread illness and death throughout the US each year. The bacterium, also called pneumococcus, is a common inhabitant of the respiratory tract and can be isolated in up to 70% of normal healthy adults. Rates of asymptomatic carriage vary with age, environment, and the presence of upper respiratory tract infections.

Population based studies have estimated that more than 60,000 cases and more than 6,000 deaths from invasive (isolates obtained from sterile fluid sites such as blood and spinal fluid) pneumococcal disease occur annually in the US. The overall incidence of invasive pneumococcal disease in the US is estimated to be approximately 21 cases per 100,000 population. The highest rates of pneumococcal disease occur in infants less than two years of age and also in the elderly. Pneumococcal disease rates for infants 12-23 months of age (~200 per 100,000) tend to be slightly higher than infants less than one year of age (~150 per 100,000).

The Indiana State Department of Health (ISDH) has conducted surveillance of invasive pneumococcal disease since June of 1998. One primary purpose for initiating pneumococcal surveillance was to monitor the rate of disease in infants less than five years of age in anticipation of the licensure of pneumococcal conjugate vaccine (PCV7). Beginning surveillance in 1998 allowed the ISDH to establish a baseline for tracking the decrease in disease rates following licensure of the new vaccine. The vaccine, known by the trade name Prevnar, was licensed in February of 2000. Initially, the surveillance conducted in Indiana was voluntary on the part of laboratories and then became mandatory for physicians, hospitals and laboratories in October of 2000.

It is felt that Indiana data from 2000 and 2001 is comparable, and therefore this report focuses on those two years. In 2000, a total of 711 invasive pneumococcal cases were reported to the ISDH, of which 135 were under the age of five. In 2001, 633 cases were reported, with 103 being under the age of five. The remainder of this article will summarize the 2000 and 2001 surveillance data for pneumococcal disease in infants under the age of five. In addition, data from the pneumococcal isolate project being conducted by the ISDH Laboratory and the ISDH Epidemiology Resource Center will be reviewed.

Invasive Pneumococcal Disease in Children Less than Five Years of Age

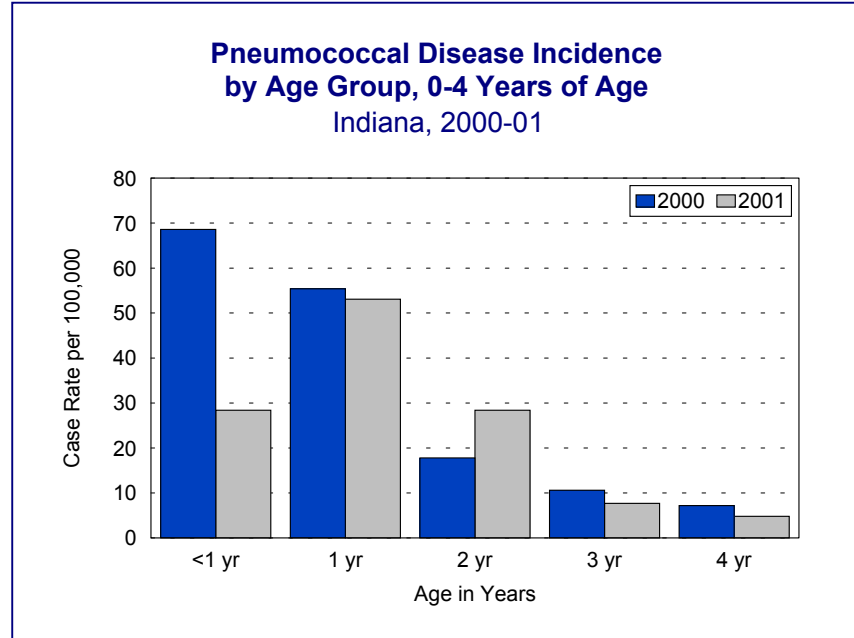
Table 1 shows the actual number of cases in infants, 0-4 years of age, in 2000 and 2001.

Table 1. Number of Invasive Pneumococcal Cases by Age Indiana 2000-2001

Age	2000	2001
<1 year	58	24
1 year	47	45
2 years	15	24
3 years	9	6
4 years	6	4
Total	135	103

The following graph depicts the invasive pneumococcal case rate per 100,000 population for 0-4 years of age.

Figure 1.



As can be seen above, the case rate for infants less than one year of age declined from 68.4/100,000 in 2000 to 28.4/100,000 in 2001, resulting in a significant drop in the case rate in just one year. Although this drop occurred only one year after the licensure of the PCV7, it is hoped this is the beginning of the same downward trend observed following the introduction of *Haemophilus influenzae* type b vaccine in the late 1980s. Children ages 1-4 showed very little change, which most likely reflects the fact that children who were already past the normal starting age of two months for the PCV7 series were not as likely to be vaccinated as a newly born infant. A decline in disease rate among the 1-4 year age group is likely to occur in future years.

During 2000 and 2001, isolates were obtained from four different body sites from children in this age group. There were a total of 238 unduplicated patients in this two-year period. Table 2 shows the frequency of sites from which the isolates were obtained. In 16 cases, an individual had pneumococcus isolated from two different sites. In all cases where isolates were obtained from two sites in the same patient, the two sites included blood and one other sterile site.

Table 2. Number of Isolates by Site of Infection in Children Under Five Years of Age; Indiana, 2000-2001

Site	Number (%) of Isolates		Number of Isolates from Second Site
Blood	213	(89.5%)	0
Spinal Fluid	22	(9.3%)	15
Pleural Fluid	1	(0.4%)	1
Tympanocentesis	2	(0.8%)	0
Totals	238		16

Of the 37 isolates from spinal fluid, 26 (70.3%) were found in infants less than one year of age, whereas only 34.5% (82/238) of all cases (0-4 years) were under one year of age. This data suggests that those less than one year of age are at greater risk to contract meningitis.

Death occurred in nine cases during the two year period, all of which were three years of age or younger. Six of the cases that resulted in death were less than one year of age, while two deaths occurred in a one-year-old child and in a three-year-old child.

The ISDH wishes to thank those local health department and infection control nurses, as well as the Immunization field staff, who have diligently collected the data for the pneumococcal surveillance system.

Pneumococcal Disease Isolate Project

As mentioned previously, PCV7 was first licensed in the US in February of 2000. PCV7 includes protection against seven pneumococcal serotypes (4, 9V, 14, 19F, 23F, 18C, and 6B), which account for 83% of meningitis cases and 86% of bacteremia cases in children less than six years of age, according to studies conducted from 1978-94.

Beginning in 2001, the ISDH Special Reference Bacteriology Laboratory began serotyping invasive *S. pneumoniae* isolates from children less than five years of age. In 2001 and so far in 2002, 30 isolates have been serotyped by the ISDH Laboratory.

Table 3 shows the serotypes identified by the ISDH Special Reference Bacteriology Laboratory. The table indicates that all vaccine serotypes have been identified in Indiana, with the exception of 9V, and that three serotypes (6B, 14, 19F) account for 72% (13/18) of all vaccine types.

Table 3. Serotypes Identified in Isolates Submitted to ISDH Laboratory

Vaccine Serotypes		Non Vaccine Serotypes	
Serotype	Number	Serotype	Number
4	1	6A	1
6B	5	9A	2
9V	0	15	1
14	4	19	1
18C	3	22	1
19F	4	22F	3
23F	1	33	1
		Other NVTs	2
Totals	18	Totals	12

Table 4. Age of Patients with Pneumococcal Isolates Submitted to ISDH Laboratory

Age	Number with Vaccine Serotype	Number with Non Vaccine Serotype
< 1 year	5	4
1 year	7	4
2 years	2	2
3 years	4	1
4 years	0	1
Totals	18	12

Of the 18 cases with isolates of vaccine serotype, only two of the cases had received any vaccine. One patient, a three-month-old infant, had received one dose of the four dose series, not enough to be considered protective. A second case, a three-year old child, had received one dose at 20 months of age, which would have been considered appropriately vaccinated. Therefore, one of the patients with a vaccine serotype could be considered fully immunized, while the other 17 infected with a vaccine serotype were not protected. These data, although limited, show that in general, children who have been infected with a vaccine serotype have not been vaccinated, and vaccine failures are occurring at a very low rate. Therefore, based on these very limited data, it appears that those being vaccinated are being protected against invasive disease.

The ISDH very much appreciates the cooperation of those laboratories that have submitted pneumococcal isolates for this project. We encourage laboratories to continue to send isolates obtained from sterile sites in children less than five years of age to the ISDH Special Reference Bacteriology Laboratory, 635 N. Barnhill Drive, PO Box 7203, Indianapolis, IN 46207-7203. **Laboratories, not currently submitting specimens meeting these criteria, are encouraged to join the project by submitting pneumococcal isolates to the ISDH Laboratory.** If laboratories have questions about this project they may contact Wayne Staggs, Epidemiologist, ISDH, at (317) 233-7112 or wstaggs@isdh.state.in.us.

The primary series of PCV7 vaccine beginning in infancy consists of three doses given at 2, 4, and 6 months of age. A fourth booster dose is recommended at 12-15 months of age. Unvaccinated children seven months and older do not require a full series of four doses. The number of doses needed for unvaccinated children seven months and older is based on age at which first dose is given (check the package insert for appropriate number of doses for these children).

As most immunization providers are aware there is currently a critical shortage of PCV7 vaccine. Providers should regularly check the CDC web site for current recommendations for use of pneumococcal conjugate vaccine during the shortage. The CDC "Current Vaccine Shortage" site may be accessed at www.cdc.gov/nip/news/shortages/default.htm.
